Urbanization and Population Change

Q: What are the trends in land use and their effects on human health and the environment?

The above question pertains to all 'Land Use' Indicators, however, the information on these pages (overview, graphics, references and metadata) relates specifically to "Urbanization and Population Change". Use the right side drop list to view the other related indicators on this question.

Introduction

The total number of people and their distribution on the landscape can affect the condition of the environment in many ways. Increasing population often means increased urbanization, including conversion of forest, farm, and other lands for housing, transportation, and commercial purposes. In recent years, many communities in the U.S. have seen an increase in developed land (residential, commercial, industrial, and transportation uses) that outpaces population growth. This pattern is of concern for numerous health and environmental reasons (Frumkin et al., 2004). For example, studies indicate that when land consumption rates exceed the rate of population growth, per capita air pollutant emissions from driving tend to be higher. Urbanization and population growth also tend to increase the amount of impervious surfaces and the quantity and types of products that humans produce, use, and discard, thereby affecting waste generation and management, water quality, and chemical production and use.

The information presented in this indicator is based on population data collected and analyzed on a decadal basis by the U.S. Census Bureau—as well as annual "intercensal" population estimates—and data collected by the U.S. Department of Agriculture Natural Resources Conservation Service's National Resources Inventory (NRI) to track "developed" land. Between 1977 and 1997, the NRI developed estimates every 5 years on non-federal lands in the contiguous U.S. Since 2001 the NRI has developed annual estimates, but based on a smaller sample size. This indicator captures trends in overall population growth for both rural and urban populations; the amount of developed land relative to the amount of population change, nationally and by EPA Region; and overall population density, also nationally and by EPA Region.

What The Data Show

The U.S. population grew from a little over 4 million people in 1790 to over 281 million in 2000; urban population is estimated to have grown a thousandfold over that period (Exhibit 4-8). The population nearly doubled between 1950 and 2000.

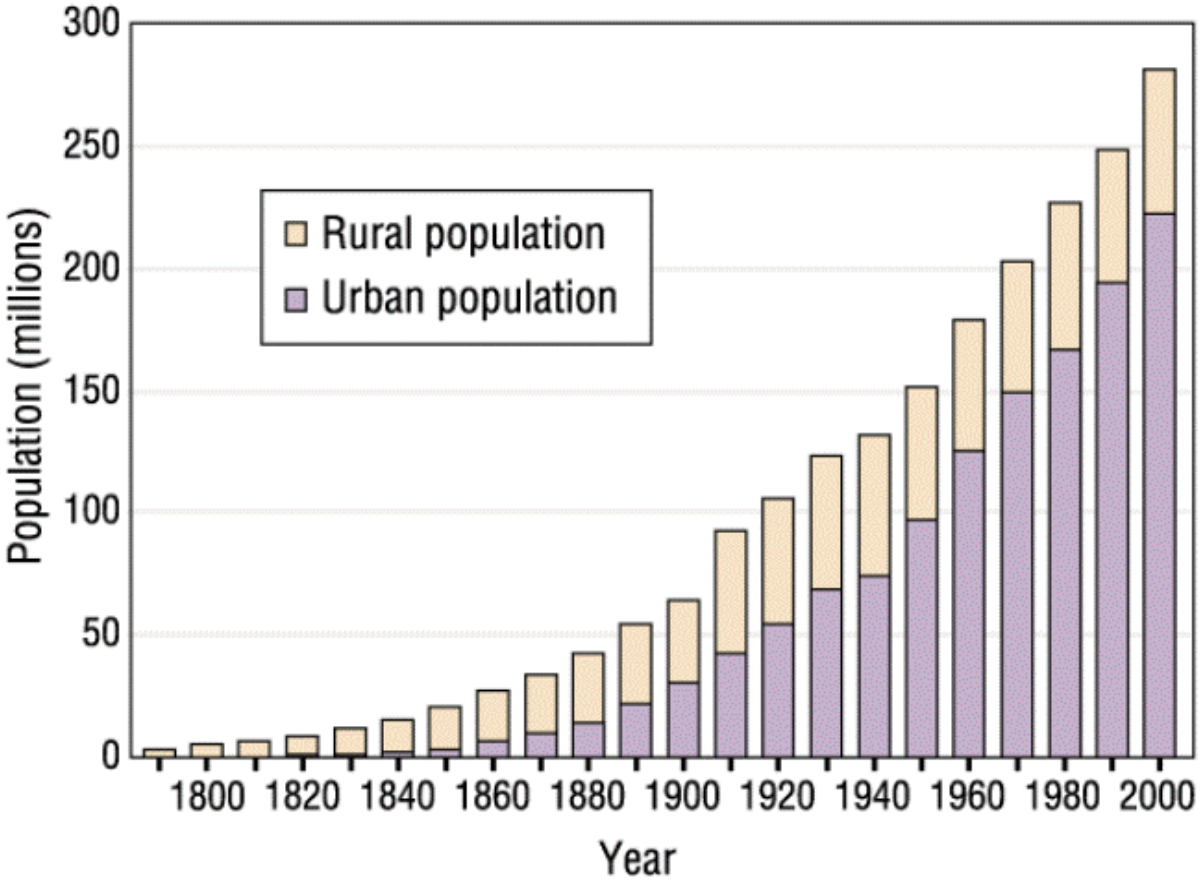
The rates of population and developed land growth over 5-year intervals increased between 1982 and 1997, before declining slightly between 1997 and 2002. Over all four 5-year increments, the amount of developed land increased at nearly twice the rate of the population (Exhibit 4-9). Between 1982 and 2003, the amount of developed land in the U.S. in the 48 contiguous states (not including the District of Columbia) grew by more than 35 million acres, representing a cumulative increase of more than 48 percent. The Census Bureau estimates that during the same period, the population of the 48 states grew by nearly 58 million people, or just over 25 percent (Exhibit 4-10).

There are substantial variations in population and development trends in different parts of the U.S. (Exhibit 4-10). Between 1982 and 2003, the growth rates for developed land were higher than population growth rates in every region except Region 8. The largest rate of increase in population between 1982 and 2003 occurred in Region 9, where population increased by more than 46 percent (nearly 14 million people). Developed land in Region 9 increased by 51 percent (more than 2.8 million acres). Region 4 had the largest rate of increase in developed land (nearly 80 percent) and the largest absolute increases in both population (15.4 million) and developed land (11.8 million acres).

Although growth rates of population and developed land were high in most Regions, population density varies significantly from one Region to the next (Exhibit 4-11). In 2010, EPA Region 2 was the most

densely populated Region, at 516 people per square mile; EPA Region 10 was the least densely populated, with an average of approximately 15.7 people per square mile (including Alaska). Between 1950 and 2010, the population density of EPA Region 9 showed the greatest percentage change, increasing by nearly a factor of four from 31 to 124 people per square mile. During the same time period, the nationwide average population density doubled from 43 people per square mile to 87 people per square mile.

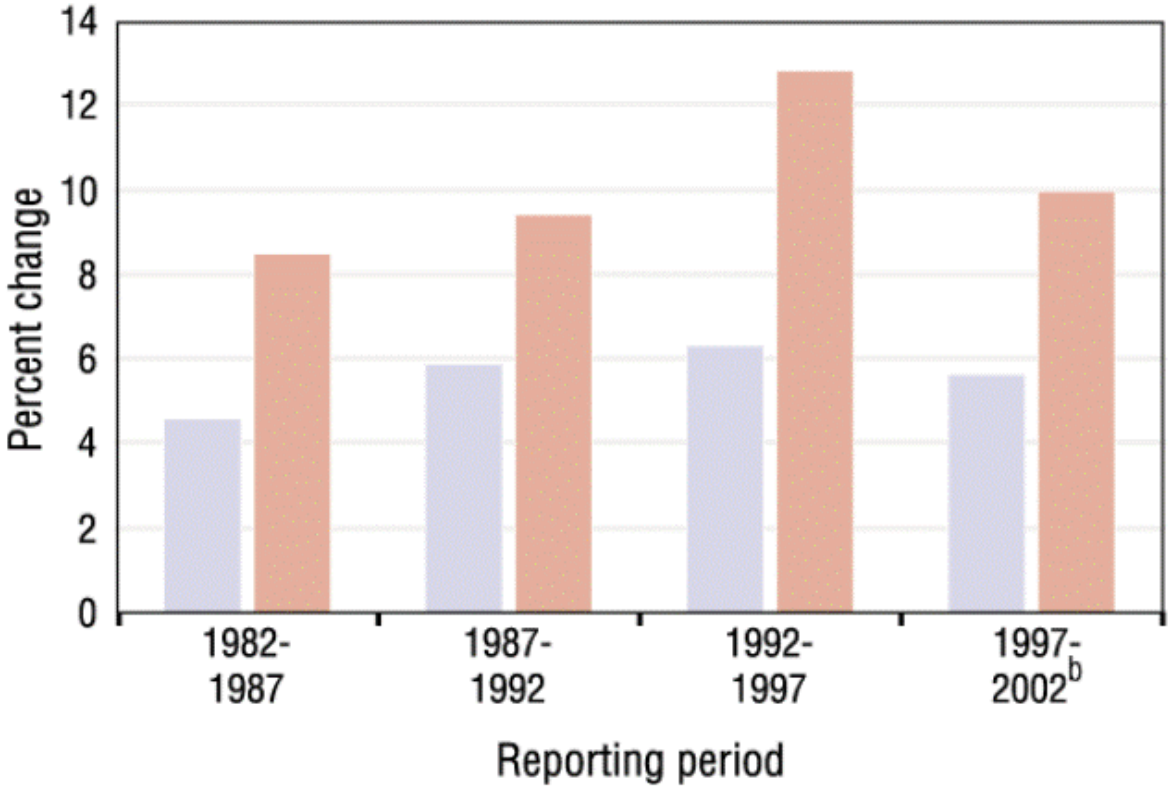
Exhibit 4-8. Population and urbanization in the U.S., 1790-2000[a]



[a]**Coverage:** 50 states and the District of Columbia.

Data source: *U.S. Census Bureau, 1993, 2004*

Exhibit 4-9. Percent change in population and developed land in the contiguous U.S. and Hawaii, 1982-2002[a,b]

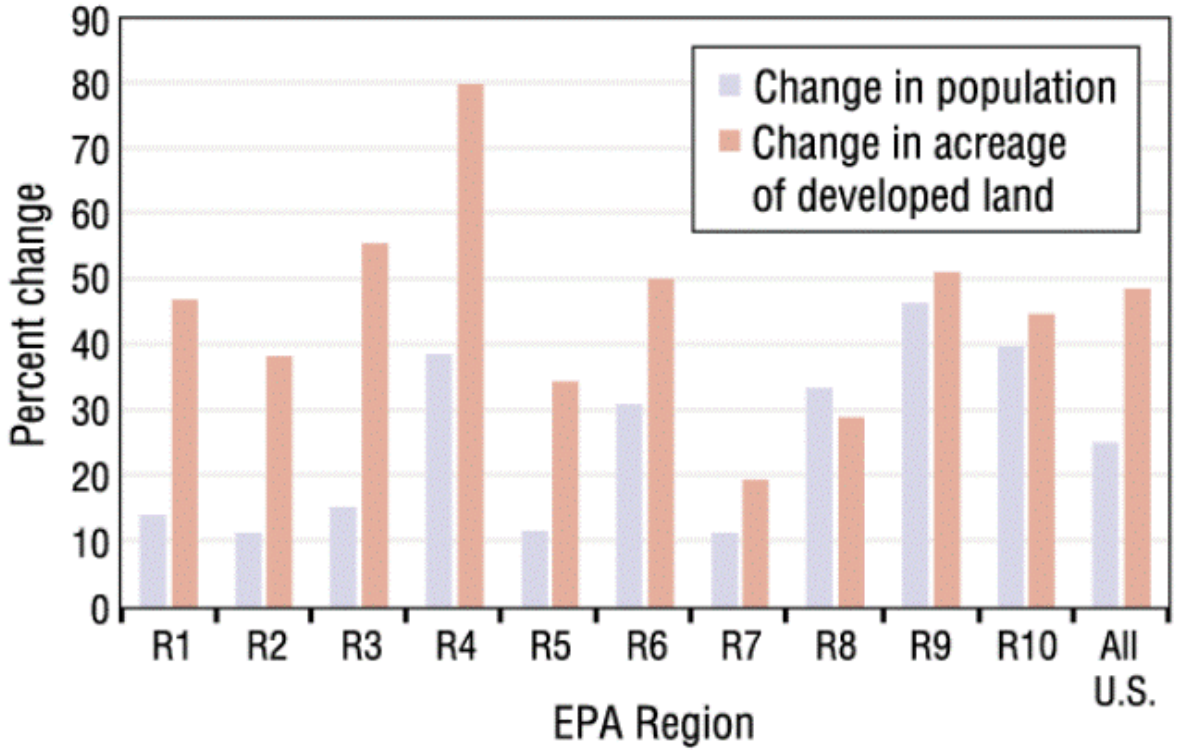


[a]**Coverage:** Contiguous 48 states (excluding the District of Columbia) and Hawaii.

[b]Based on changes in the NRI inventory approach, Hawaii was not sampled in 2002. Thus, the percent change in developed land from 1997 to 2002 is based on the 48 contiguous states only.

Data source: *U.S. Census Bureau, 1996, 2002b, 2006; USDA NRCS, 2000, 2004*

Exhibit 4-10. Percent change in population and developed land in the contiguous U.S. by EPA Region, 1982-2003[a]

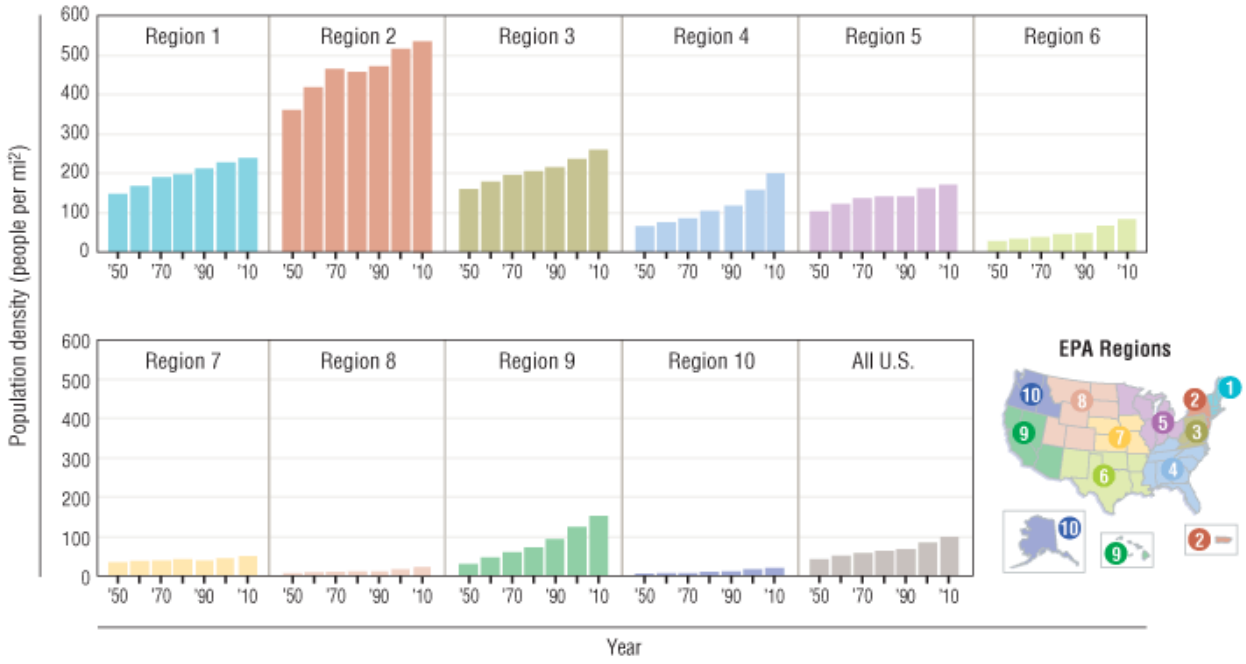


[a]**Coverage:** Contiguous 48 states (excluding the District of Columbia).

Data source: *U.S. Census Bureau, 1996, 2002b, 2006; USDA NRCS, 2007*

EPA Regions

Exhibit 4-11. Population density in the U.S. by EPA Region, 1950-2010[3]



[3]**Coverage:** 50 states and the District of Columbia.

Data source: *U.S. Census Bureau, 2002a,c; 2011*

Limitations

Census data:

- Intercensal figures are estimates based on administrative records of births, deaths, and migration, and thus differ from the decennial census data in methodology and accuracy.
- Sampling and non-sampling errors exist for all census data as a result of errors that occur during the data collection and processing phases of the census.
- Puerto Rico and Virgin Islands data are not available for all years, and thus have not been included. This affects the accuracy of the statistics for Region 2.
- The criteria for estimating urban population have changed over time as defined by the Census Bureau.

NRI data:

- NRI sampling procedures changed in 2000 to an annual survey of fewer sample sites than had previously been sampled (starting in 1977, the NRI sampled 800,000 points every 5 years). Fewer sample points mean increased variance and uncertainty.
- The NRI collects some data across the entire nation, including Puerto Rico and the Virgin Islands. Land use statistics, however, are not reported on federal lands or for Alaska and the District of Columbia. In Exhibit 4-10, Hawaii is also excluded.

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Data Sources

Urban and rural population data for Exhibit 4-8 were obtained from two U.S. Census Bureau publications: data from 1790 to 1990 are from U.S. Census Bureau (1993); 2000 data are from U.S. Census Bureau (2004). This exhibit will be updated following publication of updated urban/rural data based on the 2010 Census, expected in late 2012.

In Exhibit 4-9, population change was calculated from annual population estimates published in U.S. Census Bureau (1996, 2002b, 2006) (estimates for 1982/1987, 1992/1997, and 2002, respectively). Changes in acreage of developed land were calculated based on acreage figures reported every 5 years by the NRI. NRI data were obtained from two publications (USDA NRCS, 2000, 2004) (1982-1997 and 2002 data, respectively). This exhibit will be updated when 2007 NRI data on acreage of developed land is published.

Exhibit 4-10 is based on annual population estimates by state, published in U.S. Census Bureau (1996, 2002b, 2006), and NRI-developed land estimates by state, published in USDA NRCS (2000, 2007). The figure was developed by grouping the published state data by EPA Region, then calculating percent change between 1982 and 2003.

Population density by EPA Region (Exhibit 4-11) was calculated based on three published data sets: population every 10 years from 1950 to 2010 by state (U.S. Census Bureau, 2002a and 2011); and land area by state (U.S. Census Bureau, 2002c).

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